

Double Trouble and the Pitfalls of Confirmation Bias: A Case Report of Acute Appendicitis, Arising in a Duplex Appendix

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ABSTRACT

With an incidence of 0.004%, the likelihood of discovering a duplex appendix is very rare. Here, we present a case of a 43-year-old man, whom underwent a laparoscopic appendectomy and washout for what appeared to be a simple case of appendicitis, as confirmed by CT scanning. Despite an uncomplicated operation, the patient continued to spike high grade fevers with persisting abdominal pain.

A repeat laparoscopic exploration was conducted, revealing a 2nd gangrenous appendix. Upon removal of the 2nd appendix, the subsequent histopathology report established that both appendix samples had a base and a tip, confirming that two distinct appendices had indeed been removed.

This case highlights the pitfalls and confirmation bias: Namely, a tendency to preferentially look for information that confirms a pre-conceived diagnosis, simultaneously dismissing information which may point to an alternative diagnosis. In doing so, we prematurely stop searching for alternative or additional explanations for the patient's presentation-which in this case resulted in a missed 2nd appendix.

Keywords: CT scanning; Histopathology; Laparoscopic appendectomy

Introduction

With an incidence of 0.004%, the likelihood of discovering a duplex appendix is very rare. As of June 2018, there have been less than 15 documented cases within medical literature of a duplex appendix being discovered during an acute episode of appendicitis [1,2]. Instead, the majority are discovered incidentally or as part of a post-mortem.

Despite the extremely low incidence rate, it's essential that we do not overlook the possibility of a duplex appendix when examining patients with right iliac fossa pain. In turn, we present a case of a duplex appendix, highlighting the pitfalls of confirmation bias.

In June 2017, a 43-year-old gentleman presented with right iliac fossa pain to the surgical admissions unit at New Cross Hospital in Wolverhampton, UK. What began as a seemingly straight-forward admission of acute appendicitis became an intriguing case as time progressed.

The patient presented with migratory right iliac fossa pain and tenderness at McBurney's point. He was pyrexial and tachycardic when assessed, however inflammatory markers were unremarkable, with no rise in either White Cell Count (5.1) or CRP [3].

He was started on IV antibiotics and a CT scan was arranged which confirmed a perforated appendix, with two visible appendicoliths. The patient underwent an uneventful laparoscopic appendicectomy and washout, during which no other abnormality was identified. The removed appendix was then sent for histopathological analysis.

Following his operation, the patient continued to complain of abdominal pain, bloating and spiked recurrent high-grade fevers. A repeat CT scan was organized at this point, which identified two collections. The decision was subsequently made to take the patient back to theatre for a laparoscopic exploration and washout.

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Surprisingly, along with the collections, the operating surgeon found a gangrenous appendix. This was removed and sent for histology. Initially there was discussion as to whether or not the initial appendix had been completely removed in the prior operation. However, histology established that both appendix samples had a base and a tip, confirming that two distinct appendices had indeed been removed.

Discussion

The lifetime risk of developing appendicitis has been cited as 6.7% for females and 8.6% for males [3]. The anatomical norm is typically of a vermiform appendix which communicates with the caecum; however a rare congenital malformation can result in the production of a duplex appendix. This abnormality occurs in only 0.004% of the population and as such, there have been fewer than 100 documented cases worldwide [1,2].

Interestingly, the majority of cases are diagnosed at post-mortem or incidentally during surgery, where there has not necessarily been a presentation of appendicitis. In addition, when diagnosed due to appendicitis, both appendices may not be affected; there have been cases where only one appendix is inflamed, whilst the other remains unaffected [4]. In turn, this creates the potential for a patient to present with a 2nd case of appendicitis, despite being considered 'post appendectomy'-potentiating future diagnostic difficulties.

The pathology behind this condition is not fully understood, however the Modified Cave-Wallbridge classification [5,6] splits duplex appendices into four main types: A B C and D, based on their anatomy:

- **Type A:** A single appendix base with two separate distal stalk
- **Type B1:** Two separate appendices, located either side of the ileocecal valve
- **Type B2:** The additional appendix arises from the taenia coli
- **Type C:** Due to caecal duplication, an appendix arises from each individual caecum
- **Type D:** A single appendix, with two separate caecal openings

Acute appendicitis is one of the most common acute surgical admissions in the UK. Being a

clinical diagnosis in majority of cases, a diagnostic laparoscopy followed by an appendectomy, is usually the investigation and treatment of choice.

That said, in some cases-imaging can also be useful, especially when attempting to rule out other differentials. Yet in the case of a duplex appendix: there is no evidence to indicate that a pre-operative CT or ultrasound scan will increase the diagnosis of duplex appendices. For instance: Not in any other reported case of a duplex appendix, has either a CT or an USS scan been able to confirm the presence of 2 separate appendices.

With that said, it reinforces the importance of thoroughly investigating any patient presenting with right iliac fossa pain during diagnostic laparoscopy. As unfortunately, this case demonstrates the pitfalls of confirmation bias: namely when the operating surgeon identified an inflamed appendix, this confirmed the suspicion of a 'simple case' of appendicitis. In doing so, the tendency is to then stop searching for alternative or additional explanations for the patient's presentation-which in this case resulted in a missed 2nd appendix.

We as doctors, utilise cognitive shortcuts, known as "heuristics", on a daily basis to quickly process a large amount of clinical information [7], to make an efficient diagnosis and management plan. With experience, these heuristics become fine-tuned, however there will always be room for human error-especially in the acute setting.

How can we do better? We propose that during a diagnostic laparoscopy for right iliac fossa pain, it's essential that the operating surgeon thoroughly examines the caecum with the possibility of a second appendix in mind. In doing so, it will negate the likelihood of overlooking a 2nd pathology, which as this case demonstrates, is very easily done. Moreover, when documenting the findings-a small note should be made that upon visual assessment, a second appendix was/was not identified.

Albeit, a simple proposal, it serves as a reminder to be thorough and to constantly re-evaluate our pre-conceived diagnosis. In doing so, this could prevent significant post-operative complications, reduce hospital stay & avoid potential medico-legal ramifications [8].

Conflict of interest statement

No competing interests.

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